



4. The Laplace transform of  $\sin(at)$  is:  
 A)  $s/(s^2 + a^2)$  B)  $1/(s^2 + a^2)$  C)  $a/(s^2 + a^2)$  D)  $a/(s^2 + a^2)$
5. The inverse Laplace transform of  $1/s^2$  is:  
 A) 1 B)  $t$  C)  $t^2$  D)  $e^{-t}$
6. The inverse Laplace transform of  $1/(s-a)$  is:  
 A)  $\cos(at)$  B)  $e^{at}$  C)  $e^{-at}$  D)  $a$
7. If  $L\{f(t)\}=F(s)$ , then  $L\{f'(t)\}$  equals:  
 A)  $sF(s)$  B)  $sF(s)-f(0)$  C)  $F(s)s - f(0)s$  D)  $F(s)-f(0)$
8. The Laplace transform is defined for:  
 A) Functions that are periodic  
 B) Functions that are purely algebraic  
 C) Functions of exponential order (Correct Answer)  
 D) All continuous functions
9. The Laplace transform of  $\cos(at)$  is:  
 A)  $s/(s^2 + a^2)$  B)  $a/(s^2 + a^2)$  C)  $s/(s^2 + a^2)$  D)  $s^2/(s^2 + a^2)$
10. The inverse Laplace transform of  $s/(s^2 + a^2)$  is:  
 A)  $\sin(at)$  B)  $\cos(at)$  C)  $t \cdot e^{at}$  D)  $\cosh(at)$

### Section II (10 Marks)

11. Evaluate  $L(t^2 e^{-t} \sin 4t)$ . CO1 Apply
12. Evaluate  $L^{-1}\left(\frac{2s+1}{(s^2+1)(s-1)(s-2)}\right)$ . CO1 Evaluate
13. Evaluate  $L\left(\frac{\cos at - \cos bt}{t}\right)$ . CO1 Apply

### Section III (20 Marks)

14. (a) Apply Laplace transform to evaluate  $\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = e^t$  with  $x = 2, \frac{dx}{dt} = -1$  at  $t = 0$ . CO1 Apply
- (b) Evaluate  $L^{-1}\left(\log \frac{s+1}{s-1}\right)$  CO1 Evaluate
15. a) Evaluate  $L^{-1}\left(\frac{5s+3}{(s-1)(s^2+2s+5)}\right)$  CO1 Evaluate.
- (b) Evaluate  $L\left\{t \int_0^t \frac{e^{-t} \sin t}{t} dt\right\}$  CO1 Evaluate.





35. If A has 4 elements and B has 3 elements, the number of functions from A to B is:  
 A.  $3^4$                       B.  $4^3$                       C. 12                      D. 7
36. If  $f: A \rightarrow B$  and  $g: B \rightarrow C$ , then composition  $g \circ f$  is defined when:  
 A.  $A = C$                       B. Range(f) is subset Domain(g)  
 C. Domain(f) is subset Domain(g)                      D. Domain(g) is subset Codomain(f)
37. If f is invertible, then f must be:  
 A. One-one only                      B. Onto only  
 C. Both one-one and onto                      D. Neither one-one nor onto
38. The inverse image of a set under a function is:  
 A. Always a subset of the codomain                      B. Always a subset of the domain  
 C. Always equal to the domain                      D. Always equal to the codomain
39. If  $A = \{1, 2, 3\}$ , the number of equivalence relations on A is:  
 A. 3                      B. 5                      C. 4                      D. 7
40. A relation  $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 1)\}$  on  $\{1, 2, 3\}$  is:  
 A. Reflexive only                      B. Symmetric only  
 C. Equivalence relation                      D. Not transitive

### Section II (10 Marks)

- 41.** If  $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$ ,  $A = \{1, 5, 6, 7, 8\}$ ,  $B = \{0, 1, 6, 7\}$ ,  $C = \{1, 2, 3, 5, 8\}$   
 Demonstrate  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ . (CO3) Remember
42. Discuss Union, Intersection, difference, Complement, and Symmetric difference of set with example. (CO3) Remember
43. Discuss relation and function with example. (CO3) Remember
44. Let  $X = \{1, 2, 3\}$ ,  $Y = \{a, b\}$  and  $Z = \{5, 6, 7\}$ . Consider the functions  $f = \{(1, a), (2, a), (3, b)\}$  and  $g = \{(a, 5), (b, 7)\}$ . Compute  $f \circ g$ . CO3 Understand
45. Let S be the set of all real number and Let R be a relation in S defined by  $R = \{(a, b): (1 + ab) > 0\}$ . Show that R is reflexive, and symmetric but not transitive. CO3 Understand
46. Let  $X = \{a, b, c\}$ . Define  $f: X \rightarrow X$  such that  $f = \{(a, b), (b, a), (c, c)\}$ . Find  
 (a)  $f^{-1}$                       (b)  $f^2$                       (c)  $f^3$                       (d)  $f^4$                       (CO3) Apply
47. If  $A = \{x, \{a\}, \{b, c\}, \{c, d, e\}\}$  compute all power set of A. CO3 Evaluate

### Unit IV

**Section I (1 Marks - MCQ)**

48. How many permutations of the word “MATHEMATICS” are possible?  
 A)  $11!$       B)  $11! / (2!2!2!)$       C)  $11! / (2!2!2!2!)$       D)  $11! / (3!2!2!)$
49. Number of ways to arrange 7 people in a row if two specific persons must sit together:  
 A)  $6!$       B)  $7!$       C)  $2 \times 6!$       D)  $2 \times 7!$
50. How many 5-digit numbers can be formed from digits  $\{1,2,3,4,5\}$  without repetition?  
 A)  $5^5$       B)  $5!$       C)  $5^4$       D)  $4!$
51. In how many ways can a committee of 3 be chosen from 8 people?  
 A) 56      B) 336      C)  $8P_3$       D) 28
52. How many permutations of numbers 1–9 are there such that all odd digits come together?  
 A)  $6! \times 4!$       B)  $5! \times 4!$       C)  $6! \times 5!$       D)  $4! \times 5!$
53. A simple graph with  $n$  vertices can have at most how many edges?  
 A)  $n^2$       B)  $n(n-1)$       C)  $n(n-1)/2$       D)  $2n$
54. A tree with 12 vertices has how many edges?  
 A) 11      B) 12      C) 10      D) 13
55. A vertex of degree 0 is called:  
 A) Pendant      B) Isolated      C) Root      D) Leaf
56. A graph whose every vertex has even degree is:  
 A) Eulerian      B) Hamiltonian      C) Bipartite      D) Tree
57. A path that visits every vertex exactly once is called:  
 A) Euler path      B) Hamiltonian path      C) Circuit      D) Walk

**Section II (10 Marks)**

58. Determine the value of  $n$  if  ${}^nC_4 = {}^nC_3$  Evaluate  
 (a)  ${}^4P_3 = {}^{n+1}P_3$       (b)  ${}^nC_4 = {}^nC_3$
59. Determine the value of the following. CO4 Understand  
 (a)  ${}^4P_2$       (b)  ${}^9P_3$       (c)  ${}^{20}P_2$

60. How many 4 – digits numbers can be formed by using the digits 2, 4, 6, 8 when repetition of digits are allowed and when repetition of digits are not allowed. CO4 Evaluate

**Section III (20 Marks)**

61. (a) How many 2 – digits number greater than 40 can be formed by using the digits 1, 2, 3, 4, 6, 7?

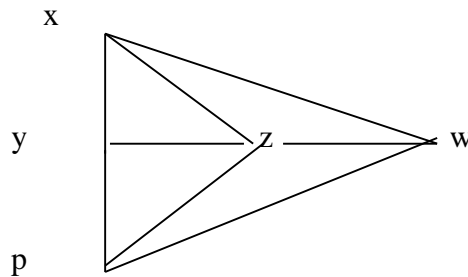
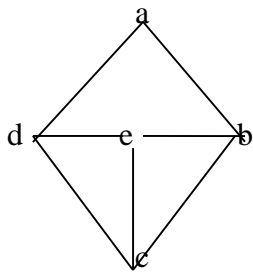
(i) When repetition is allowed.

(ii) When repetition is not allowed. **CO4 Evaluate**

(b) Discuss undirected completed graph. Also draw undirected complete graphs  $K_4$  and  $K_6$ . CO4 Evaluate

62. (a) How many permutations can be made out of the letters of the word “Basic” ? (i) begin with B? (ii) end with C? (iii) Band C occupies the end places? CO4 Evaluate

(b) Show that the given graph is isomorphic. **CO4 Evaluate**



**Marks Distribution**

**CO Wise**

CO	Q. No	Marks
CO1	1,2,3,4,5,6,7,8,9,10	95
CO2	11,12,13,14,15,16,17,18,19,20	95
CO3	21,22,23,24,25,26,27,28,29,30	95
CO4	31, 32, 33, 34, 35, 36, 37, 38, 39, 40	95
Total		380

**Unit Wise**

<b>Unit</b>	<b>Q. No</b>	<b>Marks</b>
Unit 1	1,2,3,4,5,6,7,8,9,10	95
Unit 2	11,12,13,14,15,16,17,18,19,20	95
Unit 3	21,22,23,24,25,26,27,28,29,30	95
Unit 4	31,32,33,34,35,36,37,38,39,40	95
<b>Total</b>		<b>380</b>

**Blooms Taxonomy Level (BTL) Wise**

<b>BTL</b>	<b>Q. No</b>	<b>Marks</b>
LOT	1,2,3,4,5,7,11,12,13,14,15,21,22,23,25,26,28,29,31,32,33,34,35	160
HOT	5,6,7,8,9,10,16,17,18,19,20,24,27,30,36,37,38,39,40	220
<b>Total</b>		<b>380</b>

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**Disclaimer:** - This is a Practice set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.